Role of Artificial Intelligence in Health Care System

Rajlaxmi Patro[1*]

[1]School Of Pharmaceutical Education and Research, Berhampur University, Bhanja Bihar, Berhampur, Odisha

Email: rajlaxmi442@gmail.com

Abstract

Artificial intelligence is the new general-purpose technology, which is capable of revolutionizing virtually every sector. Through artificial intelligence, machines can execute any complex or simple task with greater efficiency and greater speed than humans would. AI could organize better treatment for patients and it also provides information with literally to the physicians. In the era of assisted living life, AI technologies combined with intelligent robotic systems lead to better life quality for elderly and disabled people. In recent years, the use of AI in medicine and healthcare has been praised for the great promise it offers but has also been at the center of heated controversy. AI could be beneficial in minimizing medical records, designing treatment plans, forecasting health events, assisting repetitive jobs, and doing online consultations, etc. at the same time it has some risks in medicine and healthcare like patient harm due to AI errors, misuse of medical AI tools, privacy and security issues, etc. So various automated systems and tools like Brain-computer interfaces (BCIs), biomarkers, Natural Language Processing (NLP), Machine Learning (ML), SVM, Neural networks, and various algorithms help to minimize errors and control disease progression. AI technology has helped deal with COVID-19 in India. It has helped with the preliminary screening of COVID-19 cases, containment of coronavirus, contact tracing, enforcing quarantine and social distancing, tracking of suspects and remote monitoring of COVID-19 patients, vaccine and drug development, etc.

Keywords: Artificial Intelligence, Machine Learning, Health, drug development, vaccine

1. Introduction

Artificial Intelligence is the combination of two words ie. “Artificial” means Objects that are produced by human beings, and “Intelligence” is the capability to form tactics to achieve goals by interacting with huge information. Artificial Intelligence is now the new electricity which is an emerging focus area in India. AI defines the ability of machines to perform cognitive tasks like thinking, perceiving, learning, problem-solving, and decision-making. AI systems work on large historical datasets for predicting future trends and outcomes at a pace that humans would not be able to match. Recently, the Government of India has taken various initiatives related to AI such as the establishment of the Artificial Intelligence Task Force, formulation of NITI Aayog's National Strategy for Artificial Intelligence #AIFORALL, setting up of four Committees for AI under the Ministry of Electronics and Information technology, etc. Some of India’s state governments have also taken a few initiatives, such as the establishment of the Centre of Excellence for Data Science and Artificial Intelligence (CoE-DS & AI) by Karnataka, the Safe and Ethical Artificial Intelligence Policy 2020 and Face Recognition Attendance System by Tamil Nadu, AI-Powered System for monitoring driving behavior by West Bengal, AI System to fight agricultural risks by Maharashtra, etc.

AI has a well-known field in computer science as it has enhanced human life in many areas. AI has great hope in healthcare, and it may allow for better prevention, detection, diagnosis, and treatment of disease. AI technology has helped deal with COVID-19 in India. It has helped in the preliminary screening of COVID-19 cases, containment of coronavirus, contact tracing, enforcing quarantine and social distancing, tracking of suspects, tracking the pandemic, treatment and remote monitoring of COVID-19 patients, vaccine and drug development, etc [1].

AI is growing by leaps and bounds. Research in clinical oncology is now more focused to decode the molecular onset of cancer by understanding the complex biological architecture of cancer cell proliferation. It also focused to process the millions of relevant cases in big data and computational biology to tackle the current scenario of expanding number of cancer mortalities around the globe [2]

Artificial Intelligence can also give therapy to breast cancer patients by Biomarkers assistant. As personalized medicine has advanced, cancer biomarker detection has grown by combining omics approaches such as genomics, proteomics, metabolomics, transcriptomics, etc., and further

enhanced by advances in technology and methods that include next-generation sequencing, mass spectrometry, circulating tumor cells, and cell-free DNA. The diagnostic biomarkers are categorized into two types: prognostic biomarkers and predictive biomarkers. Prognostic biomarkers provide information against treatment, whereas predictive biomarkers respond to the outcome of the treatment [3].

Healthcare systems around the world face significant challenges in achieving the 'quadruple aim' for healthcare: improve population health, improve the patient's experience of care, enhance caregiver experience, and reduce the rising cost of care. The application of technology and artificial intelligence (AI) in healthcare has the potential to address some of these supply and demand challenges. Here, we summarise recent breakthroughs in the application of AI in healthcare, describe a roadmap to building effective AI systems and discuss the possible future direction of AI-augmented healthcare systems.

2. Advantages of AI in Healthcare System

- AI can reduce time by doing some time-consuming tasks like MRI, CT scan, ultrasound, etc. Biomarkers technology helps to detect certain diseases within a few seconds in the human body. The algorithms ensure the possibility of automating the bigger part of the manual work in specifying these biomarkers.
- AI is also a cost-reducing system such as someone doesn't need to run to the hospital for displaying their medical report, as artificial intelligence personal assistants can suggest to patients on medical issues. Patients can even connect patients directly to doctors for advice, thus reducing the cost of visiting the hospital.
- AI also plays a role as a virtual health assistant. It can assist the Physician as well as the patients on several issues.
- AI will reduce human mistakes by completing some of the complicated tasks like data arrangement, inspection, etc. It can store people's data in a single place, that can utilize this information to see into the previous and current health problems and such comparison of disease information's helpful to the physicians to make a more accurate diagnosis.
- AI helps in the prevention of diseases at macro level forecasting that calculates the probability of spreading the disease.

- AI technologies are used for performing robot-assisted surgeries. AI Surgical System allows for performing the most accurate movements. The complex operations are conducted with minimal pain, blood loss, and low risks of side effects.
- AI also is adopted by wearable healthcare technology for better-serving patients. Software such as FitBits and smart watches adopt AI to update the user as well as their health professionals on the potential health risks and problems.
- AI in some cases replaces the nurses also. SOPHIA is a widely known social robot that was developed to serve as a companion for senior citizens. This robot symbolizes the potential technology holds in enhancing how robots can operate on a human-like level.

3. Limitation of AI in health Care system

The most obvious and direct weakness of AI in healthcare is that it can bring about a security breach with data privacy. As it grows and is developed based on information gathered, it also is susceptible to data collected being abused and taken by the wrong hands. The limitation of AI is, Machine Learning algorithms can learn to see patterns similar to the way doctors see them. But the difference is that algorithms need a lot of concrete examples to learn, depending on various data collected from millions of people who have experienced similar symptoms and conditions. To enable the proper comparison, the AI database should contain sufficient information about the patients of the particular group. Hence, if there is a lack of information about a person from a certain background, AI can provide an inaccurate diagnosis. As a result, the doctor provides the wrong treatment and care to the patients.

A rise in unemployment rates among healthcare workers. Since AI has been implemented throughout the healthcare system on a larger scale, many activities that were traditionally performed by humans can be done by machines nowadays. Chatbots and robots can provide mental health help, analyze the condition of a patient's health, etc. Therefore, many people can lose their work and it may replace doctors in the future. The AI software detects diseases from the X-rays with higher accuracy than radiologists can.

4. Types of AI and its application

Artificial intelligence is a collection of different technologies that play an important and great role in the healthcare field, but some of them play a vital role in this field, they are discussed below.

4.1.Machine Learning

Machine learning is a broad technique that acts statistically for fitting models to data and to learn by training models with data. According to a Deloitte survey of 1,100 US managers Machine

learning is one of the most common forms of AI. In 2018 this survey was carried out, among 1100 US organizations around 63% of companies were using Machine Learning in their Businesses.
In the healthcare field, the most common application of traditional machine learning is to find out the exactness of medicine and which treatment Protocols should be followed to get a high success rate based on the Patients disease symptoms and the treatment context. It's mainly based on the supervised learning principle where a training data set for which the outcome variable is unknown was fixed. The neural network is the most complex form of machine learning that views problems in terms of inputs, outputs, and weights of variables that are related to inputs and outputs. Deep learning is also a complex form of machine learning used for the recognition of potentially cancerous lesions in radiology images.

4.2.Natural language Processing

Since 1950 the main goal of artificial intelligence is to make sense of human language such as speech recognition, text analysis, translation, and other goals related to language. The main application of Natural language processing involves the creation, understanding, and classification of clinical documentation and published research. It is also based on machine learning, particularly on deep learning neural networks.

4.3.Rule-based expert system

Rule-based expert systems based on the collection of IF-THEN procedure were the dominant technology for artificial intelligence in the 1980s and it is widely used commercially in current and alter periods. This system will consume time and will replace healthcare with more approaches based on data and machine learning algorithms.

4.4.Physical Robots

Physical robots are plays a breathtaking role in the surgery field. Surgery like gynecologic surgery, prostate surgery, and head and neck surgery can be done by robots by following the common surgical procedures however important decisions are still made by human surgeons. In 2000 initially, the USA approved surgical robots which provide Superpowers to surgeons improving their ability to see, create precise and minimally invasive incisions, stitch wounds, and so forth.

4.5.Robotic Process Automation

This technology performs structured digital tasks for administrative purposes that is those involving information systems, as the robots were human users following a set of scripted rules [4].

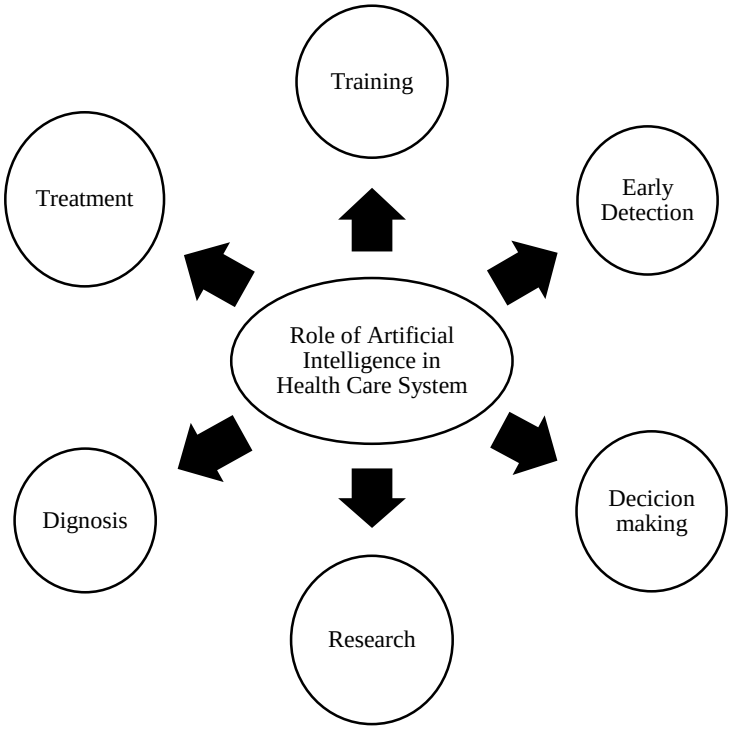

Fig. 1. Role of artificial intelligence in health care system.

5. Challenges in AI development

Artificial Intelligence in healthcare has several obstacles. A large set of data is required to train machine learning algorithms or neural networks. Generally, we do not get accurate data or unbiased data, as it was collected from different sectors which contain noise, bias, imbalance or incomplete information, etc. The model trained on one hospital data may not be generalizable to another. As a result, researchers must ensure that the data they collected represents the intended patient group. Another important challenge is the decision-making ability, patients may die due to wrong insight given by the AI. So it is necessary to provide accurate information to AI when any action is to be carried out by the AI.

6. Conclusion

From the above study, it was concluded that AI has an important role to play in healthcare offerings of the future. Through machine learning, we can primarily develop precision medicine which is a widely needed advance in care. Although early efforts at providing diagnosis and treatment recommendations have proven challenging, we expect that AI will ultimately master that domain as well. However, there are some limitations are there but by developing software and security

guidelines these limitations can be preventable. Hence, in future trends, AI will play a major role in the healthcare system due to its several advantages.

7. References

1. Nirupam Bajpai et.al Artificial Intelligence and Healthcare in India ICT India Working Paper #43 2020.
2. Muhammad Javed Iqbal et.al Clinical applications of artificial intelligence and machine learning in cancer diagnosis: looking into the future Iqbal et al. Cancer Cell Int. 2021, 21:270.
3. Nilofer Shaikh et.al A Review on Computational Analysis of Big Data in Breast Cancer for Predicting Potential Biomarkers, Bentham Science Publishers, Current Topics in Medicinal Chemistry, 2022, 22, 1793-1810.
4. Thomas Davenport et.al The potential for artificial intelligence in healthcare 2019 Jun; 6(2): 94–98. The future healthcare journal.
5. Fei Jiang et.al Artificial intelligence in healthcare: past, present and future, Stroke and Vascular Neurology 2017; 2:e000101. Doi: 10.1136/svn-2017-000101.
6. Junaid Bajwa et.al Artificial intelligence in healthcare: transforming the practice of medicine, Future Healthcare Journal 2021 Vol 8, No 2: e188–94.
7. Yue wang et.al The value of AI in the Diagnosis Treatment, and Prognosis of Malignant Lung Cancer, 2022, 2, Article 810731.
8. Jissa George et.al AI in Medical Field, International Conference on Intellectual Property Rights, 2021.